

# Solar Glitter

*Sandia National Laboratories, Emcore, Endicott Interconnect Technologies, International Micro Industries, National Renewable Energy Laboratory, Universal Instruments*

## Problem

Our expanding use of electronic equipment has increased the demand for reliable, affordable energy sources to power them. Concern over environmental damage caused by the use of fossil fuels is driving energy providers to seek out alternate renewable power sources. Sun and wind are both viable options, but of these, only solar power has the potential for widespread portable use. Traditionally, the collection and conversion of sunlight to electricity has been expensive. However, Sandia scientists have developed glitter-sized photovoltaic (PV) cells that have the potential to achieve the cost breakthrough necessary to move solar energy into the mainstream.

## Innovative Edge

The miniaturized solar cells are produced using Sandia's Microsystems-Enabled Photovoltaics (MEPV) technology, which employs microdesign and microfabrication techniques common to the semiconductor, LCD, and microsystems industries. The PV cells are then "printed" onto a low-cost substrate with embedded contacts and microlenses for focusing sunlight onto the cells. The small size of the collectors makes versatile applications possible. "Eventually, units could be mass-produced and wrapped around unusual shapes," said Greg Nielson, lead investigator for the project. If integrated into buildings, tents, and potentially clothing, MEPV technology would allow users such as hunters, hikers, and military personnel to recharge batteries for phones, cameras, and other electronic devices while in the field.





## Commercialization and Industry Impact

Continued MEPV development is focused on making this 2011 Federal Laboratory Consortium award-winning technology the most efficient, versatile, and inexpensive way to produce electricity for three distinct markets: power utilities, building owners, and individuals. MEPV can be combined with new manufacturing and installation concepts to achieve a price point, making solar energy a competitive energy source. Likely initial users include those requiring logistical or tactical power such as warfighters and early responders, but applications could be as far reaching as satellites and remote sensing devices.

Sandia's role in MEPV technology development has been to design, fabricate, and test MEPV cells, modules, systems, and devices. A number of mutually beneficial partnerships were instrumental in bringing the technology to fruition. Partners including companies (Endicott Interconnect Technologies, EMCORE, International Micro Ind., and UI), laboratories (NREL), and universities (UCF, USF) provided the expertise required to move the technology forward as an increasingly efficient, reliable, and affordable energy alternative. As of mid-2011, six patents had been filed for various aspects of the technology and talks with additional potential partners currently continue.



Greg Nielson (center) and coworkers hold up samples of the solar glitter cells.